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DR. NIELS FINSEN.

THE AMERICAN
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Devoted to Practical X-Ray Work and Allied Arts and Sciences.

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Report on N-Rays.*

BY ANDRE BROCA.

It is a dangerous task at present to make a report of the n-ray. This question, almost grown old in a year, is strongly controverted. Certain persons have gone so far as to deny the existence of these rays. This is in consequence of the difficulty and extreme delicacy of the observation of n-rays, and because the technic necessary is truly over-refined. I began to work on this subject in January, and I was not able to see the phenomena until about six weeks ago. It seems a unique experience in the history of science to find that phenomena which are so difficult and delicate to observe are at the same time so important theoretically and practically. However, the same thing has occurred in connection with auscultation, with the microscope, and with the work of Pasteur. In all of these cases a new and delicate technic must be mastered and new methods must be employed. Doubts are raised which influence even the best of men, and truth has great difficulty in making headway. Again, it must not be forgotten that in making experiments on the attraction and repulsion of electrified balls the experiment will often be a failure, but this does not impeach our electro-technic.

The following observations on the n-rays are incomplete, subject to errors, the causes of which had to be learned from day to day, and which were very frequently due to the existence of n-rays under conditions very difficult to anticipate. It is because I failed to strike the same difficulties daily after I had found the explanation of my mistakes that I am emboldened to say a few words on such a difficult subject. I make no pretense of giving a complete and adequate exposition; I give only a few thots upon the theory; but I do emphasize the technic and the difficulties encountered for the purpose of placing in the hands of physicians a useful instrument. In this account of my work I have referred to many things, some of which are only provisional; others approach the great verities of science. I also admit some possible errors. I have not written this paper for the purpose of giving my personal experience, but to give what I know to be for the best interest of science and medicine.

DISCOVERY OF THE N-RAYS.

In 1904 Blondlot believed that he had measured the speed of the propagation of x-rays, making use of their action upon a small spark, which gave greater brilliance when the rays emanating from a Crookes tube fell upon it. He found that what influenced the spark propa-

*Translated from *Archives D'Electricite Medical* by J. Z. S. Haywood, D. es. Sc.

gated itself with the speed of light and that it was also polarized. The spark is active when the conductors which produce it are in the same plane with the kathode ray generator and the line of observation; it is inactive when in the perpendicular position. The plane of polarization is turned by the action of quartz or by a piece of sugar. But the facts of polarization and rotation as above prove the existence of two circular rays, comporting themselves, after the law of Fresnel, precisely like quartz, rotating respectively to the right and left and propagated with different velocities. Blondlot found that the rays which influenced the sparks were refracted by a prism of quartz, having an index of about 2, differing from the x-rays, which are not deviated by the prism. In the above experiments he measured the velocity of propagation, not of the x-rays themselves, but of radiations, both refrangible and polarizable, which are found mingled in the tube with the x-rays. To these rays Blondlot gave the name of n-rays, and the fact that they have the same velocity as light shows that they are analogous to light, or, at least, are related to electro-magnetic undulations of the same species as the light or waves of Hertz.

With a quartz lens distinct foci are obtained, proving either a good emission of a discontinuous spectra of the n-rays, or a good selective absorption by the quartz of the radiations emitted by the Crookes tube.

Leaving the question open relative to the emissions of the Crookes tube for the present, we will direct our thots toward the rays which were observed to deviate.

N AND N_1 RAYS.

For readily observing the action of the n-rays on small sparks, Blondlot placed at a distance of some centimeters from the spark a piece of unpolished crown-glass and studied the variation in brightness, both directly by the eye and by photography. The apparatus must be carefully and accurately adjusted, and, above all, the distance perfectly regulated. We employed as the source of electricity the secondary, wrapped with medium wire, of a Du Bois-Raymond coil, placed about four centimeters from the maximum position; the coil was then excited by a single accumulator.

It is likewise useful for the observation of the light emitted by means of blue glass, for the modifications of the n-rays were especially produced in the emission of the blue rays. One should have a small gas flame, conveniently adjustable, so as to obtain a given condition to which the n-rays are sensitive, as shown by their variation in brightness. Then, again, they may be made to act upon a thin plate or wire of platinum rendered incandescent by an electric current, or, better still, upon a sheet of white paper clearly illuminated by means of a blue light (Gutton).

But the most convenient procedure consists in the employment of sulfid of calcium, rendered phosphorescent by light, and of which we observe in darkness the variations of phosphorescence under the action of n-rays.

The latter procedure, whose technic is so simple, has made it possible for the n-rays to exhibit themselves thru a considerable range. The other procedures are still more difficult, and tho photography of the little spark permitted Blondlot to prove the existence of these rays; this is almost wholly impracticable for common use.

The employment of phosphorescence is

a far more delicate procedure than the others, and much more difficult; nevertheless, the technic will be described in detail. In a large number of cases the phenomena were observed on very small surfaces; for this reason Blondlot at first employed a hooded screen. For their construction he took a thick mixture of collodion and calcium sulfid, which he applied with a brush to pasteboard in spots about the size of a pea. The difficulty is to make the layer homogeneous, so as to be able to judge easily the exact difference in brilliance between them. The best practice is to make a small groove with a file in some solid that is transparent to the n-rays, wood or aluminum, in which the sulfid of calcium is placed. We thus have a clear line in which the modifications are well seen. Cover the whole with a coat of collodion in order to preserve the sulfid and to avoid oxidation by the air. If these directions are followed we should avoid all failure. I made an effort to replace the collodion with gelatin. The screens thus obtained were not durable, the sulfid rapidly falling off. In doing as has been described, we have a screen which, if always a little variable, is still permanent. However, the screens are much better when freshly made and when the sulfid of calcium has been recently prepared. I use only the best quality of sulfid and preserve it in a stoppered flask, or, better still, in a sealed glass tube. Sulfid of zinc can be used equally as well, but it is inconvenient because it looses altogether too quickly its phosphorescence. This renders its employment less easy, and it is also too costly. Each observer should form any kind of a design he prefers by means of these grooves, a small cross or diesis, or, better still, several circular grooves.

On a screen of this kind, previously insolated and placed in a dark chamber, the beams are soft, and light as if bathed in a nebulous haze. The brightness is augmented under the action of the n-rays, at the same time becoming sharper. These two characteristics together bestow a greater visual acuity to the eye and permit one to discern much better the details of the screen. The observations should not be made immediately after the screen has been insolated. If this has been very strong the brightness is not affected by the action of the n-rays. One should wait a certain time, about one minute, to find it in the best condition. Nearly all observers have found this moment much the best and the screen under these conditions most brilliant. Occasionally it is possible to continue the observation for a quarter of an hour or even for half an hour, but this is a disadvantageous condition, and it is better to insolate the screen every five minutes in normal weather.

The artificial lights in general are bad for exciting the screen. One should when working in the evening use either the electric arc or the magnesium lamp, or Auer's burner without a glass. The ordinary lamps do not give good results. The observations should be made under diverse conditions, either in absolute darkness or, better, in relative obscurity. I have observed them equally well in both conditions. Blondlot advised the employment of a feeble yellow light to illuminate the screen. With this kind of a screen the luminous shafts which deviate, becoming a deeper blue under the action of the n-rays, were more easily seen. In fact, the yellow light should be so regulated as not to show the bluish light in the ab-

sence of the n-rays. It will appear under the action of the latter.

I will end this chapter by indicating the precautions, physiological and psychological, which must be taken in order to secure conviction in the observation of the n-rays. First of all, one gets his retina in a proper condition of sensibility. It ought to be, as far as possible, adapted to darkness or at least to a feeble light. No observation should be attempted immediately after coming from out of doors, nor immediately after somewhat severe physical exercise.

Experiments with the n-rays are much more difficult than the ordinary experiments in photometry, altho the differences to be judged are much greater. Really what one must decide in the experiments is the difference in the brightness which occurs successively on the same plate, and it is the memory which plays the principal role. We know how short is the memory for visual impressions; it is, therefore, very difficult to convince oneself of the existence of the n-rays at a given instant. One reaches complete assurance only after repeated experiments of an increase in brightness of the screen when it passes a determined point in space.

It is better when one believes he sees a difference in luminosity, in moving the exploratory screen, to choose two positions, between those points where you suspect the existence of n-rays, and to transport successively the screen from one of these positions to the other; let this be done by an assistant who instantly makes the change to the point indicated by you.

These experiments should never be made unless the observer himself directs the change. In fact, when you lend your unremitting attention to this work it is all but impossible to make the changes uniform. It is sufficient, in order to convince oneself, to catch these luminous excitations on the threshold. You observe considerable of these variations (from one to three or four) from one moment to another, and this is what requires deep attention. All experiments of this kind should be made without forced attention; the first condition, then, is tranquility of spirit; above all, there should be no risk of a surprise, and in consequence should the observer himself order the changes of position, then he can observe in entire tranquility.

In order at all times to be able to know what changes of state permit one to be sure of the existence of a bundle of n-rays, one ought to inure himself to the use of certain suitably constructed absorbent screens. But this procedure is subject to errors which we can control if the various screens be always, according to circumstances, the same distance from the sources of the n-rays. One ought to bear in mind the fact that the phosphorescence is influenced by many things, principally by heat. The observation of physiological radiations may be completely spoiled by this factor. But one ought to be able to distinguish the two actions by their net differential characteristics.

The action of the n-rays on the sulfid shows a certain loss of time and this delay may continue for some seconds. But the delay is much less than occurs under the action of heat. Moreover, at the moment of the cessation of action the difference in the time lost becomes much greater.

There is still another property by which we can distinguish between the two effects. In the action of the n-rays the augmentation of luminosity does not appear unless one looks in a direction nearly normal to the phosphorescent surface.

When it is about 45 degrees no difference is perceived; on the contrary, when one observes below the plane of incidence the effects are transposed, there being a diminution of luminosity in that direction at the times that the normal emission is augmented.

We find, as we go along, a number of circumstances in which instead of an augmentation of luminosity under the action of the radiations of Blondlot there is, on the contrary, a diminution. Blondlot has given to the rays which produce this effect the name of n_1-rays. We shall see shortly the explanation, thru the presence of both n and n_1-rays in the same emissions of sulfid of calcium properly insolated, a peculiarity which has been described by Blondlot relatively to a difference of emission of sulfid in the two directions.

Leaving this question, we will return to the practical application. Macé de Lépinay has proposed to make a screen of sulfid of calcium with a thin plate bent at an angle less than a right angle, the two sharp faces to be unequal in size. The small face is then placed normally to the source of the n-rays, and the large face receives them very obliquely. One can also, following the author, work as in the case of ordinary photometry—that is, to estimate the difference in brightness of two neighboring plates. I have not attempted personally this procedure and hence can not pronounce judgment upon it.

VARIOUS METHODS OF PRODUCING N-RAYS.

With these means of observation one can test nearly all the sources of light. In particular the Auer burner and Nernst lamp emit both n and n_1-rays. The sun emits them very intensely.

Besides the ordinary sources of radiations which emit at the same time both light and n-rays, there have been found a great number of other sources of n-rays. Jégou found n-rays emitted by the liquid of a Leclanché cell in activity. Colson has excited it in certain chemical reactions, as, for example, when KOH is poured into a solution of $ZnSO_4$, then we have the n-rays (there is no radiation produced on pouring $ZnSO_4$ into KOH). This is caused by the formation of complex basic salts in the first reaction, which are not produced in the second. Hence, one can say that Blondlot's rays are produced by many chemical reactions.

Likewise in the phenomena of imbibition, one should use in n-ray experiments moistened cardboard to form the screen. In this procedure it is not well to use the damp screen for observation too soon after it has been moistened, for in this case it will be itself a source of n-rays. Moreover, one should never fail to verify directly a screen after having used it, otherwise one is exposed to grave errors.

One extremely powerful source of n-rays is sulfid of calcium insolated by submission to another source of n-rays. We have here an explanation of the augmentation or the diminution of visibility by the action of the n-rays on the human eye. Practically we obtain a powerful source for n-rays in insolating the sulfid and then observing the rays emitted from it thru a slit of some other substance, as aluminum, for example.

Heretofore we have considered the emission of n-rays by ordinary sources of radiation or, at least, by those sources in which we immediately comprehend whence the energy proceeds. But one can also observe them under extraordinary conditions, emitted by bodies in forced

equilibrium, and that during an unlimited time. Thus it is that tempered steel, bent wood, stretched wire and Rupert's drops are indefinite sources of n-rays. Blondlot possessed a tempered cutlass of the time of the Merovingians which emitted n-rays for actually an hour.

We have not the space at our disposal to mention all the sources of n-rays which have recently been discovered, e. g.. the liquefaction of gases (Bichat), the poles of a voltaic pile (Bichat), etc. Indicating merely certain pecularities where the variations of brightness of the sulfid appear without one being able for the present to say truly that they produce n-rays, for example, when the sulfid is placed in a non-uniform magnetic field (Gutton), or near a sonorous body (Macé de Lépinay).

But we have kept for the last the most interesting fact for the readers of this journal, the discovery, made by Charpentier, in December, 1903, that n-rays are emitted by all animal organisms, especially when in a state of activity.

Edouard Meyer has extended this statement to include plant life.

We will only mention these here, reserving the right to take them up fully after we have studied the physical properties of the radiations.

(To be concluded.)

Kryptol, a New Substance for Electric Heaters.

United States Consul-General Frank H. Mason, at Berlin, Germany, describes in a report a resistance material recently invented for heating purposes. This has been designated as kryptol. The new substance is a mixture of graphite, carborundum and clay, so combined as to form a loose, granular mass of powder of different grades.

This substance is used as the conducting material in various forms of electric heaters. One form, adapted for cooking purposes, consisting of a porcelain tray about two feet square, with two carbon electrodes fixed at opposite sides. The kryptol powder is spread over the surface of the tray to a depth of about one inch. Coming in contact with the electrodes, it closes the circuit, and in a very short time is raised to incandescence. The cooking utensils may be placed directly upon this, and the amount of heat is regulated by brushing to one side as much of the material as is not needed, or by varying the depth of the powder on the tray. The greatest heat is developed where the layer of kryptol is thinnest. When it is desired to discontinue the heat, the circuit is broken by brushing the powder away from one of the electrodes.

Other forms of heaters for warming rooms are constructed in somewhat the same style as steam radiators, the device consisting of a cast-iron, flanged radiator, the interior of which is glazed so as to insulate the kryptol mass with which it is filled. At each end of the radiator an electrode—usually of gas carbon—is introduced. An ordinary heater of this type takes from four to five amperes at 120 volts.

This substance is being used in industrial work, for annealing metals or for any purposes requiring an easily regulated source of heat. The kryptol, it is said, will withstand any temperature up to 3,000 degrees centigrade.—*El. Review.*

Some Newer Conceptions of the Nature and the Management of Bright's Disease.

Abstract of a paper by ALFRED C. CROFTAN, M. D., Chicago, Ill.

Nomenclature and Definition.—The terms Bright's disease, nephritis and even albuminuria are not uncommonly employed synonymously. It appears almost trite to correct this popular misconception by the statement that Bright's disease is a systemic disorder that usually, but by no means invariably, produces nephritis; that nephritis is often due to Bright's disease but may also be due to a great number of other causes; and that albuminuria is a common, though not a constant, symptom of any form of nephritis. The term "Bright's disease of the kidney" is, therefore, not tautological, as many claim, altho "the kidney of Bright's disease" would be a more correct expression. The term Bright's disease could with advantage be altogether eliminated from modern medical nomenclature, for what Bright originally described includes many renal disorders that have since been shown to be morbid entities *sui generis*. To retain the term, therefore, means confusion.

The cardinal symptoms of Bright's disease in the newer sense are, in the order of their frequency and sequence, (1) cardio-vascular; (2) nephritic; (3) cerebral; (4) retinal.

The cardio-vascular signs must appear first. The old idea that the kidneys are always primarily involved, that as a result of renal inadequacy certain excrementitious bodies are retained, and that these produce the changes about the heart and arteries, the eye ground, the brain, does not apply to Bright's disease as I interpret it. This sequence of events unquestionably occurs in many forms of nephritis, but these are not Bright's disease, for many nephritides run their course without cardio-vascular changes; above all, without retinal or cerebral symptoms. In Bright's disease there is always increased arterial tension, always some accentuation of the second aortic sound, always some hypertrophy of the left heart—and in fact, I do not think we should diagnose Bright's disease without such cardio-vascular changes.

The intoxication of the heart and arteries, with the resulting high blood pressure, leads to nutritional disorders in different parts of the body. It is not surprising to find that particularly those organs that are supplied by *end arteries* are chiefly involved, for in them vascular disturbances must first produce nutritional derangements. Chief among the organs supplied by end arteries are the kidneys, the retina, and the brain, and I think this explains the frequent involvement of the kidneys, eyes and brain in Bright's disease.

The fact that the retina and the brain are often injured before the kidneys, that cases of Bright's disease run their fatal course occasionally with practically no renal changes, but with serious apoplectiform brain lesion and retinitis, bears out this conception and constitutes a valid argument against the common belief that the nephritis is the primary event and the determining phenomenon of the disease.

Further than this, always conceding

(as one must, I believe, nowadays) the toxic origin of Bright's disease, no specific susceptibility of the kidneys, the retina and the brain to the toxins that produce the disease need be postulated, for the involvement of the arterial system alone, as outlined above, would in most cases determine changes in these organs.

That various symptoms, that one might call tertiary, follow the nurtitional and degenerative changes in the various organs affected, need hardly be emphasized. I refer, e. g., to the edemas, the retention of solids and water, and the other evidences of renal inadequacy that are consecutive to the nephritis.

CAUSES.

I am an ardent convert to the belief that Bright's disease is produced by circulatory toxins. Of the exact chemical character of these poisons we know very little. Their presence, however, is clinically revealed to us by their manifestations. There seems little doubt from the experimental evidence at our disposal that many of them are intermediary products of metabolism, poisonous precursors of non-toxic terminal products, that have escaped complete oxidation. I refer, for instance, to the group of purin bases, including such bodies as xanthin, hypoxanthin, etc., that are normally converted into innocuous uric acid and eliminated as such. These purin or alloxuric bases, as I showed in 1900 ("The Role of the Alloxuric Bases in the Production of the Cardio-Vascular Changes of Nephritis," *American Journal of the Medical Sciences*, 1900), are capable, when injected in small doses for long periods of time, of producing the changes about the heart and arteries and kidneys that are so characteristic of Bright's disease. Many other products of perverted or arrested metabolism, as well as several of the inorganic salts when present in excess, and some poisons of gastro-intestinal origin, are capable of exercising the same effect.

The source of these bodies is twofold, namely, the gastro-intestinal tract and the proper tissues of the body. There is no more prolific source of poisons than a disordered bowel. Digestive disorders not only directly lead to the formation in the intestines and the absorption into the blood and tissue juices of a mass of abnormal and highly toxic degradation-products of the proteids, fats and carbohydrates of the food, but they also indirectly lead to hepatic insufficiency, a disorder that is most prolific in causing a flood of poisons to circulate thru the organism. It is not surprising to find that the liver cells are so often impaired in their function when the gastro-enteric tract is disordered, for all the poisons generated there are sucked up by the root tendrils of the portal tree, and are carried thru an intricate labyrinth of closely interwoven capillaries around and thru and into each hepatic cell; for a time the latter can withstand the stream of toxic matter and can properly exercise their disintoxicating function, but an overwhelming mass of putrefactive material flooding them at one time, or small quantities of putrid excrement irritating them chronically, must needs impair their function and render them inadequate to protect the organism as a whole from bowel poisoning. When this occurs, intestinal toxins filter thru into the circulation beyond and there can exercise their deleterious effects upon the heart, the arteries, and also those organs that chiefly supplement the disintoxicating function of the liver by eliminating poisons, namely, the kidneys.

One other consequence of this hepatic insufficiency is the incomplete elaboration of the aforesaid intermediary products of metabolism that reach the liver from the general circulation. When the liver cells can no longer properly perform their many functions because they are poisoned from the bowel, then these bodies that circulate around each hepatic cell in a network of lymph and blood channels as intricate as the capillary branches of the portal system can no longer be converted into innocuous end products, like urea, uric acid, creatinin, etc., but are returned to the general circulation unchanged as poisonous ammonium salts, purin bases, and a host of other bodies that, unless rapidly eliminated thru the kidneys, produce a chronic auto-intoxication.

Finally, the character of the bile becomes changed, its physical properties are perverted, it no longer flushes the bile channels in a broad stream, but often becomes more thick and viscid, so that some diapedesis of poisonous bile-constituents from the bile into the blood capillaries occurs; the change in the quantity and composition of the bile reduces its germicidal power and hence intestinal putrefaction is increased, or, at least, not checked; constipation supervenes, right disassimilation of the enteric contents is prevented; the assimilation of fats is decreased, and consequently the general nutrition is disturbed. In this way a vicious circle is closed, and both in the bowel and in the tissues at large poisonous bodies continue to be formed that are capable of producing numerous disorders, among them many of the symptoms of Bright's disease.

TREATMENT.

Based on the above conception of the gastro-enteric, and by implication, hepatic origin of many cases of Bright's disease, an intelligent prophylaxis and a conservative treatment of early stages of the disease should be directed toward the correction of the disorders in the bowel and the liver. I am a firm believer from my clinical observations in the digestive origin of many—I might say most—cases of Bright's disease, and I believe that in numerous cases early attention to the digestive tract will check the progress of the disease, and not infrequently produce a nutrition to normal even when the heart is already considerably hypertrophied, and when the kidneys are already showing evidence of nephritis.

Symptomatic treatment in Bright's disease is not, however, the conventional treatment of the kidneys, but the treatment of the *heart* and of the *arteries*. This is clear from what has been stated above. Later, when nephritis is established, it becomes necessary, of course, to counteract the bad effects exercised upon the organism as a whole by inadequacy of the renal functions.

The management of Bright's disease may fitly, therefore, be discussed under these several heads: (1) Prophylactic and causal, directed against the perversion of the digestive and hepatic functions; or, when possible, against the development of the aforesaid obscure metabolic disorders. Second, symptomatic, directed primarily against the development of cardio-vascular changes; secondarily, against the results of nephritic changes. The symptomatic treatment of the common cerebral and retinal changes is synonymous with the treatment of the heart and arteries. Finally, treatment of the patient as a whole is of paramount importance, particularly as regards the maintenance of general nutrition by adequate,

if necessary, mathematically regulated feeding, and as regards the conservation of a hopeful mood, and the prevention of those great perversions of all functions, viz., depression, fear and worry.

To Prevent Intestinal Putrefaction.—Aside from the common dietetic rules, the lavage of the stomach, etc., two remedies have been found to be of particular value, viz., the sulfo-carbolate of zinc and the bile acids. While neither of these substances constitutes an intestinal antiseptic, I do believe that the proper administration of either of these drugs can check at least the putrefactive decomposition of albumins; and as the albumins furnish the bulk of the most toxic intestinal bodies something is gained thereby. I have been in the habit of giving the sulfocarbolate of zinc in one grain doses at frequent intervals, together with some twenty grains of bismuth subnitrate in the twenty-four hours. The bismuth salt I utilize merely as an indicator of the action of the sulfocarbolate of zinc, in the following sense: It is well-known that the putrefactive disintegration of albumin leads to the formation of sulfids; the latter combine with bismuth salts to form black bismuth sulfid, hence the administration of bismuth by mouth practically always leads to the formation of black stools, because there is nearly always some putrefaction going on in the bowel. If, however, sufficient sulfocarbolate of zinc is given, all putrefaction will stop, and the stools, despite the administration of bismuth, do not become black. The proper dose, therefore, of sulfocarbolate is *enough* to prevent the formation of bismuth sulfid in sufficient quantity to color the feces. When this is accomplished it will be found that the urinary evidence of bowel putrefaction also disappears, as manifested by the reduction of the indican, and other conjugate sulfates, the compound glycuronates, and the compound glycocalls.

The administration of bile salts is of value, because these bodies possess marked germicidal properties and, moreover, constitute a very efficient cholagogue and stimulant of the hepatic function. Their administration may, therefore, be imagined to aid in combating casually and directly the development of hepatic insufficiency and its consequences. At all events, their effect upon the constitution of the feces and the urine as far as the elimination of putrefactive bodies is concerned is almost as marked as in the case of sulfocarbolate of zinc.

I have so far been unable to find that other so-called intestinal antiseptics act as well or as rapidly as the two named bodies.

To Strengthen the Heart and Reduce the Blood Pressure.—Notwithstanding the chronic character of Bright's disease, I am not afraid to give digitalis from the beginning, and to continue its use for years. Large doses are unnecessary and even harmful, because the heart is already over-stimulated, but small doses, and by this I mean one drop of the tincture three times a day, influence the heart's action in a favorable manner, not by prolonging the diastole and enforcing the systole, but by rendering the heart less susceptible to the disturbing stimulation of circulating toxins. That digitalis possesses this power has been demonstrated experimentally. I give small quantities of digitalis not, therefore, in order to stimulate the heart, but in order to regulate it and to protect it from the effects of a chronic intoxication. The heart does not thereby lose its power to respond to larger doses

of digitalis, so that the objection that one should reserve digitalis to the last, in order to "have something in reserve," becomes invalid.

Better than digitalis and its congeners is the exercise treatment of a heart in Bright's disease that needs stimulation and whose muscle tone is beginning to flag. A Schott treatment often accomplishes wonderful things in Bright's disease; unfortunately it is not easy to carry out unless one can absolutely control the patient. Where I have been able to apply it the results have been excellent thruout, even upon the kidneys; the albumin almost invariably decreases, and the excretion of solids increases within a short time.

To reduce the blood pressure, nitroglycerine is the favorite remedy, and justly so. I have recently begun to use erythrol tetranitrate, a preparation that seems to grant a prolonged vaso-dilator effect. It is good practice to keep patients under the influence of this drug for long periods of time, particularly if one is attempting in the meantime to discover and remove the underlying cause of the increased arterial tension. As far as the nephritic manifestations are concerned, vaso-dilation is of much value, for one may, I believe, say axiomatically that as soon as the blood pressure falls in the kidneys the albuminuria decreases, and the renal epithelia regain their tone and become better able to perform their function.

Valuable adjuvants to the drug treatment of high arterial tension are certain physical means, and I can not say enough in praise of the hot bath, rest in a warm bed, judicious exercise and massage; in fact, of any measure that causes prolonged dilatation of the superficial blood vessels. To enter into the finer mechanism of this effect, to discuss the exact indications for the employment of these different measures in varying individual cases, would lead me too far.

Four points in the treatment of the nephritic manifestations of Bright's disease I wish to emphasize, because they are modern. I refer (1) to the use of a more liberal diet; (2) to the restriction of liquids; (3) to the withdrawal of chlorids; (4) to the so-called surgical treatment of Bright's disease.

Liberal Feeding in the Nephritis of Bright's Disease.—In feeding any case of nephritis, two fundamental axioms should be followed, viz.: (1) To give a diet that is least irritating to the kidneys. (2) To adequately nourish the patient; for by following the first rule we place the kidney, relatively speaking, at rest, we spare the diseased organ; by following the second rule we bestow upon the organism as a whole sufficient strength to combat the disease process, and to undertake regeneration where degeneration has taken place. In all acute forms of nephritis that run a short course the sparing of the kidney is the most important task, as the organism has enough reserve pabulum in storage to maintain adequate nutrition during the short duration of the disease; in such cases underfeeding or even starvation of the patient is not only permissible, but good practice, for the less of excrementitious material the kidneys are forced to eliminate the more rapidly do they resume their normal function. One may say in a broad sense that the daily amount of feeding, expressed in caloric value, should be inversely proportionate to the presumable duration of the nephritis. Hence the more chronic the nephritis, the more nutritive should be the diet, and as the nephritis of Bright's is the most

chronic variety we have to deal with, a case of Bright's disease should receive daily the full caloric value in his diet that is required to maintain nutritive equilibrium, i. e., at least thirty calories per kilogram of body weight.

Whereas, therefore, in certain acute and subacute forms of nephritis a milk diet is permissible, even useful—for, I may add in parenthesis, a milk diet reduces intestinal putrefaction and hence removes a prolific cause of renal irritation—such a regime, as I have pointed out elsewhere (The Dangers of an Exclusive Milk Diet, etc., *Medicine*, May, 1903), is to be condemned in the chronic forms of nephritis, and in particular in the nephritis of Bright's disease.

There is, moreover, no compelling reason why a mixed diet should not be given. It is puerile and altogether unscientific to postulate that the albumin given by mouth should appear as such in the urine, and that the more albumin the patient eats the more will he secrete—and still this prejudice exists in the minds of many. A diet containing variety and above all a diet of sufficient caloric value to nourish the patient should be carefully selected, and only those articles excluded that we know lead to the formation of urinary end products that are eliminated with difficulty, and hence can be assumed to irritate the kidneys when they are diseased. The details of this selection can not be given within the narrow frame of this article.

The Restriction of Water Drinking.—This point has been touched in discussing the dangers of an exclusive milk diet above. Regarding Bright's disease as a primarily cardio-vascular affair, it stands to reason that the flooding of the heart and arteries with much liquid can only increase the arterial tension, and overwork the heart. It is common practice to give much water in all forms of nephritis (witness the many waters on the market that are sold as "cures" for Bright's disease, etc.!), the object being presumably to "flush out the kidneys." I regard this as fictitious, excepting in the convalescent stage of certain clearly circumscribed varieties of parenchymatous nephritis. The first thing the kidneys stop eliminating when they become diseased is water, hence water in this stage passes the kidney parenchyma with difficulty, and to attempt to force it thru is to irritate the kidneys when they should be kept at rest.

That water is irritating to the kidneys when they are diseased is manifested by the good effects exercised in many cases of nephritis by sweating. There is no evidence to show that the sweat of nephritics contains much of toxic bodies; it does contain some urea, a moderate quantity of common salt, and above all abundant water. The chief advantage, therefore, of sweating seems to be to rid the organism of the *water* that the kidneys can not properly eliminate. The common habit, therefore, of sweating a patient, on the one hand, and giving him abundant water, on the other, is irrational, for to do this is to neutralize the good effect of the sweating, to irritate the kidneys and to overtax the heart and arteries. I have made it a broad rule to gauge the the water intake largely by the water output—carefully considering all the while the particular requirements of each case. I never force water drinking, but am always more inclined to restrict fluids.

The Withdrawal of Sodium Chlorid.—It is a well-known fact that nephritic kidneys commonly fail to properly eliminate

sodium chlorid, i. e., ordinary table salt. A very ingenious theory has been advanced to show that this retention of chlorids in nephritis can in part be incriminated with the production of edemas; the idea being that sodium chlorid in the tissues requires a certain amount of water to hold it in solution in such dilution that the normal molecular concentration, i. e., the osmotic pressure, of the blood and tissue juices is not changed (one of the chief functions of the kidney being that of an osmo-regulatory apparatus, intended to eliminate salts when the blood concentration becomes too great). It is postulated that the sodium chlorid retained in the tissues draws water from the blood by a process of osmosis, and that hence edemas develop. Basing on this theory, the attempt has been made to restrict the ingestion of chlorids, i. e., to withdraw table salt from the diet for the purpose of reducing edemas, by giving the kidneys a chance to slowly get rid of the accumulated chlorids. Clinically this experiment has quite often given favorable results, and I have, in common with many others, repeatedly seen edemas disappear (and incidentally albuminuria often decrease) when the chlorids were excluded from the food. On the other hand, edemas in such cases can often be caused to reappear when salt is again given. As 100 grains of common salt require about three pounds of water to form the proper physiological solution in the body, it is clear that any sudden increase in the weight of the patient may mean salt—and hence water—retention and should put us on our guard above all for deep edemas and should induce the careful clinician, tentatively at least, to withdraw the chlorids from the food.

The So-called Surgical Treatment of Bright's Disease.—The operation of decapsulating or splitting the kidney for the cure of Bright's disease may be mentioned merely to be condemned as altogether irrational. I fail to find in the literature a single case that could clinically be considered a true case of Bright's disease that has ever been permanently benefited by decapsulation of the kidney. The majority of case reports are so inaccurate, as far as the diagnosis of the disease is concerned, that they are practically without value.

[Excellent results are claimed in Bright's disease by the use of electricity alone. But however this may be, to Dr. Croftan's thoroly sensible suggestions should be added some others regarding electro-therapeutic measures that can be used to good advantage. In the first or eliminative stage of treatment the high-frequency current; either by the Oudin resonator, the couch, or the large helix; assists both by promoting perspiration and by its destructive influence upon the toxins. Afterward the general tonic effect of "positive insulation" with a static machine, and the local stimulus of a strong galvanic and sinusoidal current sent thru the liver, kidneys and bowels, are extremely useful.—EDITOR.]

Electrotherapy in Diseases of the Eye.

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Conjunctivitis, etc.—In all acute inflammations of the lids or of the eyeball, the galvanic anode may be applied to the closed lids with an intensity of two to five milliamperes for five minutes to each eye, once or even twice daily. The cathode should be placed upon the back of the neck, over the second and third cervical vertebra.

The anodal static breeze from a pointed wooden electrode is also very beneficial in inflammation or irritability of the eyes. Eye waters or other physiologic applications are of course in order. As this paper is confined to the consideration of physiologic therapeutics, the purely medical treatment will not be discussed.

Trachoma.—This may be treated in two ways: By means of a copper or zinc electrode, as it is technically called, Metallic Electrolysis, and by the anodal needle. If by electrolysis, the granulations are to be carefully but thoroly gone over with a flat copper or zinc electrode (copper preferred), attached to the anode of a galvanic battery. Only a sufficient number of cells are to be included in the circuit to carry the required current, which should not exceed two to five milliamperes, applied for two minutes, daily. In some severe cases the application may be much stronger, say ten to fifteen milliamperes, for a few seconds only. Every part should be acted upon in a greater or less degree.

If the retrotarsal fold be involved, as it frequently is, install a solution of holocaine into the eye, protect the ball by means of a thin tortoise shell or hard rubber blade and then pass a thin copper electrode over the inner lid with a current intensity of three to five milliamperes for three minutes. The instrument must be kept moving over the surface in order to prevent its adhering to the same. Every other day will be frequent enough, and once a week, if a strong current be used.

A more effective way is to treat each granulation with a platinum needle connected with the anode of a galvanic battery. Two to four cells will be sufficient as a rule. The needle is to be inserted into each granulation and destroyed by electrolysis. As the needle will adhere to the tissue, the polarity of the battery must be changed for a few seconds before attempting to remove the needle. Before attempting to reverse the current it must be turned completely off, then reverse it by means of the commutator, remove the needle, reinsert it, again change to the anode, turn on the current and proceed as before.

All electrodes should be thoroly disinfected after being used, as trachoma is highly contagious.

Tumors of the Lids.—If cystic, open, turn out the contents and act upon the interior with a small cathodal electrode with an intensity of ten milliamperes for one or two minutes. The entire surface should be cauterized, causing adherence of the surfaces with obliteration of the sac.

Wild Hairs.—These are to be removed by electrolysis. A small steel needle may be used, as only the cathode is admissible in electrolytic work of this character. A current of one or possibly two milliamperes will be sufficient, to be passed until

the hair can be removed without traction. Only a sufficient number of cells should be included in the circuit to carry the required current. A bowl of water in which the anode is immersed should be placed so that the patient may dip one finger at a time until sufficient contact has been made, after the needle has been introduced. Sudden makes or breaks of the current while the needle is in position will cause discomfort. If more than one hair is to be removed, do not act upon any in close proximity to each other; too much irritation will result. This will also apply to facial work as well.

Cataract.—Much may be accomplished in this affection, and in some cases the sight may be nearly if not quite fully restored. One electrode is to be placed upon the closed eyelid and the other on the back of the neck, over the second and third cervical vertebra. A cotton covered disc one inch in diameter will be large enough for the eye. Both pads should be well wetted. The eye pad may also be wetted in a solution of cocaine, if deemed better. Having the electrodes in position, turn on a current strength of three to five milliamperes for five or ten minutes, changing the polarity every two minutes, without shock, invariably closing with the cathode on the lid. This frequent change of polarity is highly conducive to absorption of the cataract, as the anode contracts the blood vessels while the cathode relaxes or expands them, thus causing a comparatively rapid change in the character of the lens. The combined current may also be used in the same manner.

If a solution of potassium iodid be used on the eye, as I sometimes do, the change of polarity can not be made, as the iodid can only be used on the kathode. The treatment of cataract should be given every other day for a year or more, with occasional intervals of cessation for a few days. Senile cataract seems to be more amenable to this method of treatment than other varieties.

Optic Atrophy.—The treatment of this condition is the same as for cataract excepting that potassium iodid is not used. Treatment must be persisted in for quite a long time. Of course, strychnia and other appropriate remedies will be administered.

Asthenopia.—This is one of the most common and at the same time one of the most obstinate conditions with which we have to deal. It is characterized by a certain weakness, with inability to use the eyes in spite of a careful correction of the anomalies of refraction if they exist. Sometimes the ocular muscles are at fault, yet the correction of such defects do not always give relief. The treatment consists in absolute rest for a few days and the daily application of the galvanic anode to the closed lids, either by double cups or singly. The cathode is to be placed upon the back of the neck and a current of two to three milliamperes passed for five to ten minutes every other day. If a galvanic battery be not available, a faradic battery may be used, giving a mild secondary anodal current, as with the galvanic. Static insulation and the anodal breeze from a pointed wooden electrode or the finger tip, gives good results.

Corneal Opacities.—In the treatment of this condition the galvanic current only is to be used. It may be applied through the closed lids, but better results are obtained by acting directly upon the opacity with metal or carbon electrode. The one most adaptable to this purpose

was made for the writer by Mr. Otto Fleming, of Philadelphia. It consists of an insulated handle terminating in a spiral spring, bent at an angle of sixty-five degrees, upon the end of which is another insulated attachment with a metallic, cup-shaped portion, which is the active part. The cathode only is to be applied to the eyeball. A 4 per cent solution of holocain is to be instilled into the eye, after which the application may be made. A current strength of one or possibly two milliamperes may be used, carefully watching the effects. But little should be done at each sitting, which should be only for one-half to one minute. As a rule there must be but a scarcely perceptible electrolytic effect upon the cornea, the intent being to stimulate the tissues into absorption of the exudate. The process is slow, but is, in most cases, very effective.

Corneal Ulcers.—These are to be treated much in the same manner, but with a small, pointed copper or zinc electrode, very lightly touching the ulcer with the anode, or by passing the anodal current thru the closed lids. Beginners should adopt the latter method.

Pterygium.—Insert a small platinum anodal needle into the narrowest part of the growth and cut off the blood supply. A current of two to three milliamperes will suffice, allowing it to pass until the part turns white, say two to three minutes. Turn off the current, reverse the polarity of the battery by means of the commutator and allow it to pass for a few seconds to allow the needle to be easily removed. One application will be sufficient, if carefully done.

Stricture of the Nasal Duct.—Electrolysis is an ideal method of dealing with this condition, but one must be careful not to attempt too much. The punctum is to be slit as for ordinary probing. Pass a probe, if one can be so used, then select one a size larger, insulate a portion of it so as to protect the punctum, attach it to the cathode of a galvanic battery, insert until resistance is met with, turn on three to five milliamperes of current and gently pass the probe electrode down the canal, allowing it to act upon the same for one or two minutes, at the same time moving it slightly up and down. Sittings may be held once a week, using a larger probe each time until the canal has been sufficiently enlarged.

Of course, if the stenosis has been caused by a bony growth or enlargement, electrolysis will not be advisable.—*Medico-Chirurgical Journal.*

Physiological Rays and Wires.—M. Charpentier, who claims to have discovered that N-rays are emitted by the living body, states that other rays are also associated with them, and some of these can be transmitted by wires. In the *Comptes Rendus,* January 25th, he describes the following experiment. A small disc of thin copper (called the transmitter) communicates by a copper wire with the phosphorescent screen used to detect the rays, the wire, in fact, being twisted a few times round the screen. The disc was from one to two centimetres in diameter, and the wire nearly a metre long, but it might be much longer. The screen was fixed in the corner of a dark room, and the disc at the other end of the wire was free. When the disc was placed near a living body the screen glowed brightly. This occurred whatever the form of wire or the obstacles between the disc and screen. An electric screen,

such as a plate of copper or aluminum, joined to earth, when interposed, arrested the radiations. Insulated metal plates did not arrest them. He concludes that physiological rays can be transmitted not only direct through air, like rays of light, but along metals, like electricity. Such sources of N-rays as tempered steel, he says, emit rays having this double mode of propagation. This discovery will be useful in the further investigation of these rays by making the screen, a copper plate covered with phosphorescent sulfid of calcium and attaching it to one end of the wire, the other end being free to apply to points of the body—for example, the different parts of a nerve. A small copper disc on the free end may be used for exploring larger areas of the body.—*Ex.*

Wehnelt Interrupter.— Hauser has found that the rate of interruption of the Wehnelt interrupter may be greatly increased and its starting potential lowered by using dilute sulfuric acid and adding to it 20 per cent of its weight of sulfate of magnesia. With sulfuric acid solution of 1.05 specific gravity, the maximum current is lowered from nearly forty amperes to 12.5 amperes at 118 volts, and the starting of the interrupter occurs at twenty volts with 5.5 amperes. A still lower starting current is obtained with a half saturated solution of sodium bichromate, to which 11 per cent by volume of sulfuric acid is added. The interrupter in that case works with only 3.5 amperes. The starting voltage (fifty volts) is, however, much higher than in the case of magnesium sulfate. The depolarizing liquid used in the Radiguet cell, consisting of 120 grams sodium bichromate, 250 cc. sulfuric acid and 720 cc. water, gives a starting voltage of twenty, a starting current of twelve amperes and a maximum voltage and current of 118 and forty respectively.—*Soc. Fisica y Quimica, Madrid,* May 25; abstracted in *Lond. Elec.,* August 7th.

Roentgen Rays in the Manufacture of Cables.

A very neat application of Roentgen rays in cable manufacture is described in *Electro* by Herr W. Otto. The chief value of this apparatus is in detecting foreign substances and imperfections in the rubber or gutta-percha insulation of electric cables. The apparatus is of particular value in preparing submarine cables, since here defects which might ultimately give much trouble and cause great expense for repair are easily detected. The device consists of a table containing the necessary regulating apparatus. On this a Roentgen tube is fixed, and above it is placed the fluorescent screen. The cable to be examined is passed through guides which conduct it just below the screen, so that the shadow of the cable is thrown upon the screen. This arrangement allows the cable to be passed through the testing apparatus quickly. Any foreign substances or a bubble of air, or even a bad joint in the rubber is at once shown. It is convenient to have the apparatus portable, so that it may be taken to any part of the works.—*Elec. Review.*

If my next door neighbor chooses to have his drains in such a state as to create a poisonous atmosphere, which I breathe at the risk of typhus or diphtheria, he restricts my just freedom to live just as much as if he went about with a pistol threatening my life.—*Huxley.*

The Progress of Cancer Investigation.

The announcement from London, by three observers, of the discovery of an important fact in the histology of malignant growths, and the corroboration of this discovery. by two other gentlemen in a paper read before the Royal Society on January 21, has stimulated our ever-present interest in this matter, and has opened a hopeful path for further investigation. The two last-mentioned gentlemen, Doctor Bashford and Mr. Murray, have been studying the method of cell division in normal and in proliferating cells, and have embodied their results in the paper mentioned above. These results bear heavily against the hypothesis of the parasitic origin of cancer, and in favor of the view that malignant growths are due to perverted cellular growth and proliferation. These observers have devoted most of their attention to the physiology of nuclear division, which, it is needless to say, is the most important part of the process of cell-division, and is a subject which has attracted a large amount of attention during the past few years. In a few words, this new discovery may be described as follows: observation has shown that, during the process of karyokinesis, the nucleus of a typical cell in ordinary human tissue under normal circumstances divides with the formation of thirty-two chronosomes, one-half of which gather themselves about each nuclear pole, and eventually form the nucleus of the new cell, the body of which is formed by one-half of the protoplasm of the original cell. Certain cells in the body, concerned in the process of reproduction, have been found to show only sixteen chronosomes during nuclear division, and to exhibit a different karyokinetic figure from that seen in ordinary cells. When such cells meet their physiological complements the normal number of chronosomes for the particular species is restored, and cellular reproduction proceeds in the usual way. Such cells are said to be gametogenic. The English observers have shown that in cancer cells from various sources sixteen is the usual number of chronosomes, and that in other ways cancer cells resemble the gametogenic cells. They have consequently suggested the word "gametoid" to describe such abnormal growth as is seen in the cells of a malignant neoplasm.

The practical indication of this discovery is that under certain forms of irritation or stimulus the normal cells of the body will change their mode of proliferation, will assume characteristics which do not properly belong to them, and in some of their vital processes will approach those of normal gametogenic cells which are known to be extremely active. When a normal cell acquires such qualities it becomes able to proliferate with great rapidity, to invade surrounding tissue with its cellular progeny, and, apparently, to engraft its abnormal powers upon cells in its neighborhood, not its descendants. Such characteristics are those, which, judging them by their results, we call malignant, and this new discovery emphasizes what pathologists have become more and more impressed with, that the study of the most minute and recondite cell processes, is what may sometime lead us to a clear understanding of what malignant neoplastic growth really is, and may perhaps indicate means for the control of such processes.

This discovery does not offer us anything new in therapeusis, but it is an advance in positive knowledge, and as such forms an element in a structure which we may reasonably hope to build to contain

the means for a successful contention with the scourge of malignant disease. It may also prove an efficient means for the differential diagnosis of neoplasms, for according to its testimony the cells of a malignant growth ought to contain sixteen chromosomes and those of a benign tumor, the usual thirty-two, for the human species.

The theory that cancer originates in latent embryonal tissue, suddenly stimulated into activity and perverse growth in some unknown way, does not appear to receive any support from the discovery which we are discussing, and in our opinion further investigations will make this theory still less tenable. There is no reason for assuming the existence of embryonal tissue as the basis of a malignant growth when all the phenomena can more satisfactorily be explained by the theory that malignant characteristics are developed in cells of various normal and properly placed tissues by some so far undiscovered stimulation which causes a perverted and luxuriant proliferation. Malignant degeneration may occur in embryonic tissue, but that is clearly not to be cited as proof that embryonal tissue is the only source of malignant disease. Such occurrences mean simply that the embryonal calls have been subjected to the same form of stimulation or irritation which produces malignant proliferation in the case of other cellular tissue.

By this discovery, additional proof of correctness is afforded to the theory that cancer, both carcinoma and sarcoma, has for its basis a form of perverted cell activity which results in luxuriant proliferation, reversion to an atypical course of growth, and the ability to invade surrounding cellular structures, imposing its characteristics upon them. We believe that this peculiar form of activity is caused by some form of stimulus or irritation, but of even the approximate character of this we are so far ignorant. We are not referring now to coarse forms of physical irritation exemplified in the causation of epithelioma of the lip, but to some sort of action not improbably brought about by chemical or physiochemical changes in the blood, which is thus unable to supply the cells of the tissue with their normal nutriment. A most hopeful line of investigation seems to be opened by the discovery announced by our English confrères, and we look forward with interest to further developments. The life history of the cancer cell promises to be most rigidly investigated, and it will be the imperfections in our technique and the inherent difficulties of the subject rather than lack of enthusiasm which will make our progress halting and uncertain. A fruitful but exceedingly difficult field for work is in the subject of the metabolism of the cells of neoplasms, and any knowledge gained here might assist us to the important goal for which all are striving—efficient therapeusis.—*Medical Record.*

A Municipal Tuberculosis Clinic.

It would be impossible to commend too strongly the clinic for the diagnosing and treatment of pulmonary tuberculosis about to be opened by the Health Department of New York. It will occupy a building on West Fifty-fifth street, immediately adjoining the headquarters of the department, and will include a registration office, two waiting rooms, an x-ray room, a throat department, and two clinics with examination rooms.

It is now admitted that pulmonary tuberculosis is curable and that under

favoring conditions nature will usually effect a cure in incipient cases. The first object of the Board of Health clinic is early recognition and correct diagnosis of cases of consumption. This is often an impossibility for the poor, who can afford only casual medical advice and that not always the most skillful. At the clinic the work will be directed by experts. Not only will careful physical examinations be made, with sputum cultures, but x-ray tests will assist in early and corrected diagnosis.

Patients applying for treatment will not only receive it, but will be given circulars of information in whatever language they can best read, containing exact and intelligible instructions as to precautions necessary to be taken to prevent the infection of others. Sputum cups and proper food for the upbuilding of the system will be supplied without charge to needy patients. Indigent and ambulatory cases and patients discharged from the public institutions of the city will be looked after at their homes and places of occupation by trained nurses constituting a special corps, and the co-operation of charitable organizations has been secured to supply food, fuel, ice, etc., where needed. One of the chief duties of these nurses will be to look after the children in the homes of consumptives and do all that can be done to prevent their infection.—*New York Times.*

X-Rays in Epilepsy.

Dr. J. H. Branth says: As regards Roentgen rays as a remedy in epilepsy, all cases of the disease are not amenable to this treatment, as, for instance, those in which degenerative processes in the brain have set in. In many instances the occurrences of the seizures is believed to depend upon the instability of the cellular brain elements, or an abnormal metabolism, and as it is accepted by many authorities that the x-ray stimulates the vital activity of protoplasm, it was on this theory that the treatment was adopted. For the results obtained, Dr. L. C. Vincent deserved at least half the credit. About a year ago he and Dr. Branth together planned the method, but, owing to severe and prolonged illness, Dr. Vincent was personally unable to take part in the practical work. Three treatments per week are given, beginning with five minutes' exposure at fifteen inches distance, and gradually increasing to ten minutes' exposure and ten inches distance. A hard, or high vacuum, tube is employed, and a different part of the cranium is exposed at each sitting. The hair may drop out in areas, but it is certain to return in a stronger growth than before. In some epileptic patients there seems to exist a bromide drug habit, and to suddenly withdraw the bromides may cause a shock to the system.

In a few instances the best results were secured by returning to small doses of the bromides in addition to the x-ray treatment. With very few exceptions the patients gain in weight at a surprising rate. A lad, fourteen years of age, who was presented by Dr. Branth, had gained nine pounds in four weeks. At the time the treatment was begun, November 8, 1903, the convulsions (grand mal) were becoming more and more frequent and severe, notwithstanding the free use of bromides. Since the date mentioned he had not had a single seizure, and his mother and his teachers had been astonished at his mental, as well as bodily, improvement. In his case the bromides had been at once withdrawn, and in addition

to the x-ray treatment to the head, the static brush had been applied to the spinal region and head. Dr. Branth said he could cite a number of such histories, varying, of course, in different particulars. The gain in weight was noticeable even in those cases in which the mental faculties did not improve so rapidly. In cases of both grand and petit mal it was observed in general that the seizures became lighter and of shorter duration, that the intervals were longer, and that when a seizure occurred it was followed by less prostration than formerly.—*Med. News.*

Does It Pay To Be A Physician?

An article appearing in *Frank Leslie's Monthly* discusses the status of the physician from a monetary standpoint and asks the question: "Does it pay to be a doctor?" In replying to this the writer makes the statement that the average income of physicians in the United States is $750 a year, a little more than the day laborer earns working eight hours a day. When we consider that a few are reputed to have an income of $100,000, a larger number $50,000, and that quite a respectable body, by dint of close application, takes in from $10,000 to $15,000, the average for the remainder must be considerably less than that given. With this alone in view it does not appear that the practice of medicine is a very alluring profession. Then there must be considered the cost of obtaining an education, which can be estimated at from $2,000 to $10,000, an investment which has made the fortune of many a business man with far less preliminary training. The arduousness of the work and the long hours bring far less financial recompense proportionately, even under the most favorable conditions, than does any other profession or business, and from this standpoint also medicine does not pay. For the man who is selfish and sordid who measures recompense by the dollar, medicine does not pay, for it is easy for a man of ordinary ability to financially outclass the doctor. But, for the individual to whom the love and gratefulness of his patients is an inspiration, who can look upon their foibles and follies, and even their petty meannesses, as the naturalist does upon aberrations from the type, who can take joy in his work and joy in the expansion of his knowledge and experience and his increasing capacity for doing good, medicine does pay. To him the seasons bring varied delight. The balmy sun, the glowing verdure, the singing of the birds, the storm clouds, the wind and the pelting rain of the summer are beatitudes. To him the softly falling snow speaks of peace, the dazzling white covering valley and hilltop and weighting the boughs of the trees call to purity and "the dim, mysterious aisles" of the forest, the stillness accentuated by the tapping of a woodpecker or the snapping of a frost-bound tree trunk, are suggestions of solemn grandeur, while to drive these clear, crisp mornings, with the sun shining and the frost sparkling, is an intoxication which quickens all his energies. For one of this kind medicine does pay and to him the profession offers its kindest favors.—*Milwaukee Med. Jour.*

The Doctor's Income of the Future.—Doctors who believe—and apparently there are many of them—that the members of their profession are different from and superior to the members of all others, in that they are constantly endeavoring to put an end to the thing out of which they live, really ought to view their

own mental condition with apprehension. The *Times* suggests that they "take something" for it before this queer delusion lets in a lot more and the unhappy victims pass beyond the possibility of help, even from such of their brethren as remain sane. Latest of many manifestations of the belief that the doctors, from a business point of view, are nobly cutting their own throats, is one that appears in the *Post-Graduate*. "It is not generally realized," says that high authority, "that the medical profession is the only one laboring conscientiously and faithfully to destroy its own source of income. Every improvement in hygiene and in sanitary science, every discovery of a specific source of disease, by improving the general health removes large amounts of money from the medical man's pocket and adds incalculably to the wealth of the community. The time will come when this fact will be generally realized." Possibly. But about the same time, there will be a realization, that the labor, conscientious and faithful as it is, and measurably successful as it has been, besides, is not destroying, or even tending to destroy, the source of the doctor's income. For the task imposed upon them is one that, if not quite endless, theoretically, most certainly will not be completed by this generation of doctors or by any generation of their succesors in whom they can pretend to have a personal interest. One can conceive, of course, of a time when medical and surgical science shall have made such progress that everybody will live on indefinitely in a state of perfect health, and there will be nothing more for doctors to do, but an enormous "meanwhile" will precede that glorious age, and while it lasts the doctors are in no danger of starving.—*Medical News.*

Massage of the Heart for Chloroform Collapse.

W. W. Keen states that on only three occasions in his entire professional life has he had a patient die on the table. The first two were cases of operations on the brain and goitre, resepectively. Hemorrhage was the cause of death in both cases, all the usual means being unavailing. The third case was especially interesting for several reasons. This patient had previously had a fracture of the skull from which he had entirely recovered. He later suffered from squamous epithelioma of the vocal cords. At the first operation unilateral laryngectomy was performed, partly under local anesthesia and partly under chloroform. The latter produced marked cyanosis. At the second operation, total laryngectomy was performed. Chloroform and oxygen were given to the patient, but not until he was upon the operating table. When enough chloroform was given to keep him quiet he became so cyanosed as to make the writer very anxious for his life. Just as the wound was ready to be closed his pulse suddenly failed and his face became suddenly blue. The operation and the administration of chloroform were immediately stopped. Strychnin was given hypodermically, pure oxygen was administered, and artificial respiration was instituted with rhythmical traction on the tongue. The battery was applied over the phrenic, but in spite of all this treatment, his heart continued to beat much faster and weaker; he became more cyanotic, and in two or three minutes he was dead. After continuing the above means for about ten minutes as a last resort the upper abdomen was opened and the writer introduced his hand into the abdominal cavity, and between this hand and the right hand, which made counter-pressure on the anterior wall of

the chest, the heart was massaged. These efforts were continued for nearly half an hour, but without avail. The writer then reports a case which came under Igelsrud's care. The operation was that of abdominal hysterectomy. There was chloroform collapse. The writer laid bare the heart by a resection of parts of the fourth and fifth ribs. The pericardium was opened and the heart seized between the thumb and fore and middle fingers on the anterior and posterior surfaces. Strong and rhythmical pressure was made for about one minute when the heart began to pulsate of itself, but as the pulsations became weaker, massage of the heart was practiced for about one minute more. From that time the pulse was perceptible and the contractions of the heart became regular. The patient recovered. The writer gives an interesting *résumé* of work by various authorities on this subject.—*Proceedings of the Philadelphia County Medical Society*, March 31, 1904.

Telephonogram.

An apparatus for recording and reproducing sound, as patented by Christian Hulsmeyer August 2, 1904, differs from the well known Edison phonograph in that the sound is recorded by the effect of light rays upon a sensitive film and is reproduced by passing the film between a source of light and a selenium cell included in a receiver circuit of a telephone. Light from a suitable source is caused to strike upon a mirror and be reflected thru a plate whose transparency varies in the direction of motion of the rays, and to fall upon a uniformly moving sensitive strip. The position of the mirror is determined by the attractive force of an electromagnet in the transmitter circuit of a telephone, so that when sound waves strike the microphone the mirror moves to and fro and the light which falls upon the film correspondingly varies in intensity, due to the varying transparency of the plate thru which it must pass.—*El. World and Eng.*

Chemical Effect of Cathode Rays.

Dr. E. Boše, of Göttingen University, has for two years past made a close investigation of the simplest possible case of a chemical action of cathode rays, with a view to ascertaining whether or not the chemical conversion due to the rays is a purely electro-chemical phenomenon according to Faraday's law (see *Physikalische Zeitschrift*, No. 12, June 15, 1904). A solution of caustic potash, saturated in the hot state, was exposed for a long time to the effect of cathode rays in a convenient outfit allowing of a large electrolyte surface—in fact, about 200 sq. cm. being radiated upon intensely, when a reduction, attended by the formation of hydrogen, was noted. The amount of electricity absorbed by the electrolyte was measured with the aid of a hydrogen voltmeter under reduced pressure, this electricity being drawn off through a platinum electrode sealed into the bottom of the testing tube. As the hydrogen present in the vacuum where the discharges took place was partly dissociated into hydrogen and oxygen, a mixture of hydrogen and oxygen, containing hydrogen in excess, was withdrawn by means of the mercury air pump, and, after the gases due to this dissociation were eliminated by an explosion, the hydrogen in excess could be measured, and its pure condition confirmed. Now, in the case of the chemical effect of the cathode rays following Faraday's law—i. e., being a purely electrochemical phenomenon—the amount of hydrogen derived from the vacuum should be strictly the same as the one

evolved in the voltmeter. A high degree of accuracy, it is true, was not to be anticipated, on account of the smallness of the effects and amounts of electricity in question, but the invariable result of the experiments was in opposition to the foregoing hypothesis, 1,030 and even more times the amount obtained in the voltmeter being derived from the vacuum. There must, therefore, be, besides the electro-chemical action, another chemical effect of cathode rays, due obviously to the kinetic energy of the cathode ray particles, this hypothesis being borne out by the theoretical considerations of the author. It is shown that, in the most favorable case, an amount of hydrogen even 1,600 times the electro-chemical amount would be obtained. But it should be remembered that, in most cases, the greater part of the kinetical energy of the rays is simply transformed into heat.—*Knowledge.*

The Use of Alternating Currents in Chemistry and the Theory of the Reactions Which They Bring About.

The chemical reactions brought about by means of alternating currents have been studied by M. Daniel, P. A. Berthelot, and some interesting conclusions have been reached. The subject was first taken up by the author in 1897, when he was studying the transformation of sugar into alcohol. The apparatus used consisted of a group of six or eight Bunsen batteries connected to an oscillating commutator, so as to reverse periodically the current thru the electrolyzing cell. This current was passed thru acidulated water, and the regulating resistance adjusted until no gases were liberated at the electrodes. The electrodes were then introduced into the aldehyde, and the effect noted. It was thot that the simultaneous oxidation and reduction might be compared with fermentation, and that alkali would be formed. To understand the action, consider the case of aldehyde in the presence of air and an alkali. Oxygen plays an electronegative role; the aldehyde the electropositive, with a liberation of heat and a change to acid; then perhaps simultaneously the acid acts electronegatively, combining with the electropositive alkali to form a salt, also with the liberation of heat. In this illustration the aldehyde alternates between electropositive and electronegative conditions, and it is such reactions that may be brot about by alternating currents. It will be realized that there are many such.—*Abstracted from L'Eclairage Electrique (Paris), in Electrical Review.*

A New Use for Windmills.

Electricity is becoming increasingly useful in farming, and with its growing importance come the various experiments at harnessing the wind and making it drive the generators. Water power, of course, is used where it can be obtained as a prime mover; but where it can not be had, steam has been called in. Steam is expensive, however, and of late experiments with wind driven generators have become numerous.

Windmills are as common in many parts of the central West as in Holland, but hitherto have been used only for purposes of irrigation. Recently, however, they have been used to generate electricity —at first for lighting houses and barns, but now for running motors used in driving light machinery. At two experimental farms in Germany two complete electrical plants are in operation, deriving their power solely from the wind, and in this country windmills are in practical use, connected with generators or with pumps, as the need of the hour demands.

On some farms several mills are coupled in operating the generators, and ten-horse power motors are worked continually. On other farms the windmills and the motors are distributed, producing lower power at various points rather than high power at a single point. Even a single large home-made windmill may generate enough power to run a two or three-horsepower motor, so that the use of electricity is not confined to those able to buy especially made windmills. For the small farmer, therefore, the possibilities of wind-driven electrical generators are very great.—*Ex.*

The Earth Currents.

M. Guarini recently gave a very interesting lecture to the Societe Belge et'astronomie; this lecture was on the much discussed subject of earth currents—that is to say, those currents which go thru the earth, but which are generally produced by some outward cause. M. Guarini says that all the theories put forward to explain the earth currents, such as the influence of the wind, aurora borealis, rain, storms, electro-chemical effects, etc., none of them accounts for an incontestable fact; for there is in the earth an earth current, whose direction is carefully marked out, going from northwest to southeast. Now a constant effect can not be due to variable causes, at any rate as variable and intermittent as those referred to above; wind, storm, etc. According to M. Guarini, the atmospheric agitations produce some of them by friction (the wind), others by induction (hail, rain, snow, etc.), certain variations of potential at certain places in the ground. These are the fluctuations of the potential, says M. Guarini, which produce at certain moments sudden variations in the intensity, and even in the direction of the earth currents.

According to M. Guarini, the earth current can only be due to a cosmic effect; that is to say, due to the rotation of the earth (the armature) round the sun (the field). By the rotation of the earth there would be induced into the atmosphere a current going in an inverse direction from that of the rotation as in dynamos; this variable current induced into the atmosphere induces in its turn in the earth's crust an inverse current; that is to say, moving in the same direction as the rotation of the earth. Now theory and observations agree with the idea put forward by M. Guarini. Siemens and Geitel have proved that the sun induces a vitreous charge into exposed objects. On the other hand, from Palmieri's observations it appears that the earth current is a current induced by the atmosphere. Lastly—and this is the most interesting fact—experience proves, as M. Guarini says, that the earth turns from west to east; that is to say, that the rotatory movement of the earth takes the same direction as that of the continuous earth currents. M. Guarini believes that it is possible, as Ampere always insisted, that it is the earth current which makes the magnetic needle deviate. M. Guarini points out that in that particular also facts and theory coincide, and he proposed an experiment to prove this.

After having spoken of the influences of tramways and transmissions with the earth as a means of return on observatories, he refers to his trials and those of the Compagnie de l'Industrie Electrique et Anecanique de Geneve, for the purpose of suppressing them completely. Lastly, the earth currents are very useful in agriculture because they decompose the chemical products which are in the earth, and replace them by others more assimilable for the plants.—*Elec. Rev.*

The Inventor's Meed

BY "INNOCENS."

A certain Man worked for a Firm. And as he worked an Idea came unto him. And not being used to such things he laid down his tools that he might think it over.

But the Foreman, perceiving this, straightway came for him and asked him in chromatic and elliptic language wherefore he labored not. Then said the Man unto him, "Verily, I have an Idea!"

And the Foreman answered him, "Thou unprofitable laborer! By what right and by what authority dost thou have an Idea in thine employer's time? Labor thou with thine hands, and sweat thou with thy brow! For I, even I, will do all the thinking that is necessary in this shop!" This said he for that he was wroth; for he never had an Idea.

And the Man answered him, "Nay, but this is an Idea whereby the arc-lamp mechanism whereon I labor may be greatly improved. The cost of production will be diminished, and simplicity thereof will be such as thou hast not imagined in thy dreams." And taking in his hand a piece of chalk he drew diagrams upon the bench.

The Foreman therefore looked on with a haughty expression, and when the Man had finished he turned and rent him for wasting his time.

Nevertheless, at the sixth hour, he cometh privily unto the Works Manager, saying, "Lo! I have somewhat to impart unto thee!" And the Manager answered, "Say on!"

And he said, "It came to pass that, as I was walking my shop, and bossing my men, an Idea came unto me, whereby thou mayest effect great economies in the production of thine arc-lamp mechanism."

And the Works Manager was astonished at the saying, for he deemed the Foreman incapable of invention. Nevertheless, he was very gracious unto him, saying, "Speak thou all that is in thy mind!"

Thereupon the Foreman attempted to reproduce the diagrams that the Man had shown unto him. And not having understood them, he got into an hopeless mess. Then said he, "Verily, when I had the Idea, I incautiously mentioned it to the Man that worketh upon these mechanisms, and he hath made foolish suggestions that have muddled me!"

The Works Manager, therefore, having passed two-score and ten years in a sinful world, saw unto the truth of the matter, and smiled, saying, "To-morrow, at the ninth hour, bring hither that workman with thee unto me. Peradventure he will, by repeating his foolish suggestions, clear thy mind for the Idea that is thine."

And as the Foreman departed he cursed three curses—one for the smartness of the Works Manager, one for the Idea of the Man, and one for his own stupidity.

The Man therefore explained his Idea unto the Manager and the Manager saw that it was good. He said therefore unto the Man, "Leave thy bench, and go into our Experimental Department and labor thou there. Our specialist shall assist thee until thou hast perfected thine Idea. Then come thou again unto me, and the Firm shall recompense thee."

After many days the Man returned, saying, "Lo, here is the mechanism which I conceived, and it worketh beautifully. What, therefore, wilt thou give me for mine Idea?"

And the Manager replied, "Tarry a little, till we get the lamps upon the market and make a profit thereby. Then shalt thou have thy reward."

So the Manager straightway patented the Idea in the name of the Firm, and it was put upon the market. And the firm profited thereby to the extent of four hundred and thirty pieces of gold in the first year, for the lamp was very good.

The Man, therefore, came again unto the manager, saying, "Where is the reward thou promisedst me? For I have seen the balance-sheet of the Firm, and lo! the profit is very great."

And the Manager smiled benignantly, and handed him a fiver, saying, "Take thou thy reward, for we believe in encouraging our employes to take an interest in their work." And he was pained at the atttiude adopted by the Man, and ordered him out of his office.

The Man therefore consulted a Lawyer who lived on Small Fry. And he, having induced the Man to sign divers documents whose purport was unintelligible, wrote a threatening letter to the Firm.

The Manager therefore kicked the Man out of employment and instructed the Firm's solicitors.

And when the case came for trial it was definitely proved that the Man was an artisan employed in the Experimental Department, and that the Specialist had had the Idea.

The Lawyer who lived upon Small Fry therefore came upon the Man for his costs; for this is apparently what the documents were about.

The Man therefore, he and his family, went into the Workhouse.

MORAL.—Whom the Gods wish to destroy, they first make inventive.—*Electrical Review.*

The Sounding and Radiography of the Large Intestine.—Schule (*Archiv fuer Verdanungo-Krankberton,* Vol. x, Part 2.)—For many years investigators have been endeavoring to solve the problem of sounding the colon; during the past few months the agitation of this subject has received a new impetus. As early as 1862 Wachsmuth maintained that under favorable circumstances it is possible to pass a tube, 166-196 cm., long as far as the valve of Bauhin.

Simon carried out a series of investigations on the cadaver a few years later and came to entirely different conclusions. He found that it was sometimes possible to pass the tube into the descending colon, but no further. As a rule the sigmoid flexure formed a figure eight through the pressure exerted, and the tube did not pass beyond the sigmoid.

Leichtenstern, Vaunyn, Boas and Kuhn have come to the same conclusion.

The latter found that the tube was usually halted on its course in the sigmoid and that this portion of the intestine was pushed upward, thus giving the impression that the tube was passing into the colon.

He believes that through combined manipulation and the careful use of the spiral tube, it is possible to prevent this curving of the sigmoid, and to introduce the tube further into the colon.

The author, who carried out an extended series of investigations, claims that it is not possible to introduce a tube into the colon with any degree of certainty, and he doubts if the living being has ever been catheterized successfully, at any rate there has been no proof of it.

He made a series of radiographs, both from the living and the dead, showing the course and position of the tube in

the sigmoid. Very often when the tube seemed to have passed nicely it was completely rolled up in the sigmoid. In some of his experiments the peritoneum was opened and the course of the tube was watched and even controlled. Even in these cases it was almost impossible to pass it into the colon. The series of radiographs presented in this article are very instructive.

The colon tube can not be used for diagnostic purposes where tumors and stenoses are suspected, for it would be impossible to determine whether the tube was meeting with one of the natural obstructions and obstacles in the sigmoid or an abnormal condition.

As to the therapeutic value of such a procedure, the author believes that practically the same end can be accomplished through rectal enemata properly applied. Mosler showed that the fluid introduced into the rectum came out through a fistula in the cecum. He also demonstrated areas of absolute dullness in the cecal region after the injection of large amounts (three to four litres) of water into the rectum.

Boas maintains that the succussion sound obtainable in the cecal region after rectal injections shows the presence of liquid in that region.

The author demonstrates very clearly thru his radiographs that fluid injected into the rectum may reach the cecum. He injects 300 to 400 cm. of oil containing a considerable quantity of bismuth in suspension into the rectum of a patient in the knee-elbow positon. The radiographs of these cases give such definite outlines of the colon that there can be no doubt as to the course taken by the oil mixture. In all of these cases the ileocecal valve proved sufficient, so that no shadow was obtained beyond this point. These pictures not only prove that it is possible to "wash out" the colon thru the simple rectal enemata, but also show the position of the transverse colon. In one of these cases enteroptosis is beautifully demonstrated. The method will certainly prove of great value in the determination of the topography of the colon in the living.—*Interstate Med. Jour.*

Self-Reliance.

Remember that all the good you accomplish is going to come out of yourself. You can not borrow it and you can not make it out of that which has been poured into you by education or otherwise. All that you receive is only a certain quantity of knowledge, acquired by education, experience, or other training, which will have a certain influence upon what comes out of yourself as your own. It is the inherent capacity to perform with your own brain which will make you what you become, and not the mere transmission of that which you have acquired. Your knowledge, therefore, is of little avail until you make it inherently a part of yourself thru mental assimilation and utilization. The clearer you comprehend these things, the more readily you can make use of them as against the process of mere acquirement with a vague motive that in some way or other what you acquire may be of benefit, or that environment will be the force that makes your talent effective. Some have gone thru experience without acquiring it, and many a man who has received an education has not got any because he allowed it to be a thing apart from his personality and it slipped away.—*Walter C. Kerr in Electrical Review.*

American Electro-Medical Society.

The executive council will admit to the program of the next meeting (December 1 and 2) papers on any branch of progressive therapeutics. Papers are expected from Dr. O. Shepard Barnum, Dr. Heber Robarts, Dr. Ivan E. Amilon, Dr. Carl Beck, Dr. J. A. Robinson, Dr. H. Preston Pratt, Dr. J. A. Robinson, Dr. John E. Gilman, Dr. Stuart Johnstone, Dr. James R. Hawley, Dr. H. L. Lewis, Dr. Sheldon Leavitt, Dr. D. A. Stevens, Dr. H. Perkins Fitzpatrick, Dr. F. A. Lensman, and several others.

The meetings will be held in the Masonic Temple, Chicago, commencing at 10 a. m. on Thursday, December 1st. This is a convenient time for those who are on their way eastward from the World's Fair formal closing.

Dr. Niels R. Finsen.

Dr. Finsen died September 24th at Copenhagen, at the early age of nearly 44, from a complication of disorders of the heart and digestive organs of long standing, which were intensified by his neglect of his own health in his enthusiastic pursuit of his investigations for the benefit of humanity.

He was the son of a poor fisherman of Faroe Island and had to work for his livelihood and his education. His health was always defective. Born in 1860, he obtained his early education in Iceland, and later studied medicine in Copenhagen and completed his university course there in 1890, obtaining the degree of M. D. at the head of his class.

While a student he became interested in the therapeutic value of light, and after graduation devoted all his energies to this investigation. His confreres thot him a crank, of course, but neither poverty nor ill health nor the indifference and contempt of others could deter him from his aim. In July, 1903, he published a paper on "The Influence of Light on the Skin," which excited great interest because of his claim that smallpox could be cured, or at least greatly moderated, by the exclusion of all but red light from the sickroom. In the following year this treatment became quite popular and Finsen's reputation was established.

Experiments were soon made upon cases of lupus, and some of these were cured by concentrated sunlight or electric light when every other known means had failed. This excited universal interest and secured for Finsen both moral and financial support in the prosecution of his experiments.

In 1896 the municipal hospital of Copenhagen gave him the use of some small buildings to continue his work. Later the Danish government came to his aid, and his enlarged institute was removed to Rosenvaenget, a suburb of Copenhagen. Here his work has been since carried on successfully in the cure of lupus and similar "incurable" diseases of the skin.

The Norwegian parliament, in December, 1903, awarded Dr. Finsen the Nobel prize of $40,000 for the most notable discovery in medical science. It was with difficulty that his friends were able to persuade him to devote even a part of this money to himself and his family. His complete forgetfulness of self, together with his chronic diseases, had prepared his family and friends for his departure after a short but extremely valuable life.

Institutes for carrying on Finsen's work have been established in nearly every civilized country. One of these—the Finsen Light Institute of America—is in Chicago. Short as was his life, he had

the pleasure of seeing his work recognized and appreciated by the world at large. This prompt recognition was due not only to the highly scientific character of his investigations, but to his full recognition of the share contributed by other investigators to his results, and to his own modesty. His salary from the Danish government was only $1,200 a year.

His funeral, September 29, was attended by the King of Denmark and the King of Greece, and nearly all the other European rulers sent personal representatives to pay their tribute to his greatness. Among scientists, ministers of state and princes were also many humbler men and women who owed to Finsen relief from pain and otherwise incurable disease.

Whatever time may finally decide as to the relative value of light, the x-ray and other means of treatments for lupus vulgaris and cancers, the fact remains that to Finsen is largely due the strong impulse now manifested toward the cure of disease by means of light. His work lives.

Origin of Radium—Sir William Ramsay in a recent lecture on radium referred to the fact that not only is the proportion of radium to uranium in rocks wherever found apparently the same, thus pointing to the uranium origin of radium, but also that the amount of helium in the composition of rocks possibly affords an internal record of the rock. It is too early to offer a reliable assertion as to the origin of radium, yet there is reason for believing that uranium is its parent and predecessor. Possibly, therefore, uranium is an unstable element and slowly degenerates atom by atom into radium, the time of half loss being, say, a billion years. Radium again degenerates into helium and other products, which in turn go through relatively shorter periods of degeneration into more stable but relatively de-energized forms of matter. It was pointed out that the evidence was strong in favor of the belief that the energy liberated by radium and its emanations was internal energy of degradation and not energy reflected from without.—*El. World and Eng.*

A New Ray.

M. di Brazza claims to have discovered a new sort of ray which he calls the i-rays. The brain gives rise to these as well as the N-rays, but the i-rays differ from the N-rays in that they pass thru moist substances.

A New Fuel.

By the aid of an electrical process a new fuel "osmon" has been produced from peat. A direct current is passed thru the mass by which twenty or twenty-five per cent of the water is eliminated. The electrically treated peat is then dried and crushed and made up into briquettes. It possesses quite a satisfactory heating power, contains no sulphur and does not smoke or leave much residue.—*Electrical Review.*